## CLAIM AMENDMENTS

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. – 43. (Cancelled)

44. (Previously Presented) An optical-waveform-sensitive routing system comprising:

(a) a router responsive to change the routing of data in response to an optical pulse having a prescribed detectable temporal waveform; and

(b) a composite grating for receiving input light pulses along an input path and transmitting, in response thereto, output light pulses to the router along an output path, the grating comprising an ordered assemblage of subgratings supported by an active material wherein

(1) each respective subgrating satisfies at least one of (i) a Bragg condition or (ii) a surficial grating condition so as to diffract a respective subbandwidth of light from the input path to the output path, and

(2) the subgratings are so configured such that an optical pulse received by the composite grating, interacting with the active material along the input path and having a prescribed address encoded input temporal waveform different from the prescribed detectable temporal waveform, triggers an output optical pulse along the output path having the prescribed detectable temporal waveform.

45. – 55. (Cancelled)

56. (New) A composite grating, comprising:

an active material; and

an ordered assemblage of subgratings supported by the active material, wherein

(1) the subgratings are to receive an input optical pulse from an input path and to generate an output optical pulse along one of multiple angularly distinct output

directions, if the input optical pulse includes an address temporal code substantially similar to one of a set of address temporal codes encoded in the subgratings, each of the set of address temporal codes corresponding to one of the angularly distinct output directions,

(2) the subgratings are to transmit noise if the input optical pulse does not include a temporal waveform substantially similar to one of the set of address temporal codes,

(3) the set of address temporal codes are each formable within the active material using address pulses each containing one of the set of address temporal codes and incident on the active material along the input path, and

(4) the multiple angularly distinct output directions are established using direction pulses each incident on the active material along one of the multiple angularly distinct output directions.

57. (New) The composite grating of claim 56 wherein the subgratings comprise spatial-spectral gratings.

58. (New) The composite grating of claim 57 wherein the active material comprises a frequency selective material.

59. (New) The composite grating of claim 57 wherein the active material comprises a non-frequency selective material.

60. (New) The composite grating of claim 57 wherein the subgratings are formed on a surface of the active material.

61. (New) The composite grating of claim 57 wherein the subgratings are formed within a volume of the active material.

62. (New) The composite grating of claim 56 wherein the subgratings comprise optical interference gratings supported by the active material and generated by interfering the address pulses with the direction pulses.

63. (New) A communication system, comprising:

an optical source to generate an input optical signal along an input path;

an active material; and

an ordered assemblage of subgratings supported by the active material, wherein

(1) the subgratings are to receive the input optical signal along the input path and to generate an output optical signal routed along one of multiple angularly distinct output directions, if the input optical signal includes an address temporal code substantially similar to one of a set of address temporal codes encoded in the subgratings, each of the set of address temporal codes corresponding to one of the angularly distinct output directions,

(2) the subgratings are to transmit noise if the input optical signal does not include a temporal waveform substantially similar to one of the set of address temporal codes,

(3) the set of address temporal codes are each formable within the active material using address pulses each containing one of the set of address temporal codes and incident on the active material along the input path, and

(4) the multiple angularly distinct output directions are established using direction pulses each incident on the active material along one of the multiple angularly distinct output directions.

64. (New) The communication system of claim 63 wherein the subgratings comprise spatial-spectral gratings.

65. (New) The communication system of claim 64 wherein the active material comprises a frequency selective material.

66. (New) The communication system of claim 64 wherein the active material comprises a non-frequency selective material.

67. (New) A method, comprising:

providing an active material capable of supporting an optical interference grating;

programming the active material with the optical interference grating, the optical interference grating providing a spatial-spectral structure corresponding to an interference of an address programming pulse and a direction programming pulse, the address programming pulse comprising a first temporal address waveform propagating along a first angular direction and the direction programming pulse propagating along a second angular direction different from the first angular direction; and

directing an optical beam to impinge upon the optical interference grating along the first angular direction, the optical beam including a second temporal address waveform substantially similar to the first temporal address waveform so as to cause the optical interference grating to produce, in response, an output optical pulse propagating along the second angular direction determined by the second programming pulse.

68. (New) The method of claim 67 wherein the optical beam comprises a coded optical data stream convolved with the first temporal address waveform.

69. (New) The method of claim 67 wherein the active material comprises a frequency selective material.

70. (New) The method of claim 67 wherein the active material comprises a non-frequency selective material.